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Modeling synthetic radar image from a digital terrain model

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ABSTRACT

In this paper we propose to simulate SAR radar images that can be acquired by aircraft or satellite. This corresponds to a real problematic, in fact, an airborne radar data acquisition campaign, was conducted in the south east of France. We want to estimate the geometric deformations that a digital terrain model can be subjected. By extrapolation, this construction should also allow to understand the image distortion if a plane is replaced by a satellite. This manipulation allow to judge the relevance of a space mission to quantify geological and geomorphological data. The radar wave is an electromagnetic wave, they have the advantage of overcoming atmospheric conditions since more wavelength is large is better crossing the cloud layer. Therefore imaging radar provides continuous monitoring

Keywords: Radar SAR images, mnt.

1. INTRODUCTION

After a brief reminder of the nature of a SAR radar image in a first part, we explain how to produce a radar image synthesis taking into account the flight parameters of an aircraft, or the orbit of a satellite. We have digital terrain models (mnt) that were provided to us by the Geographical Institute of France (IGN). We must also explain how to generate the speckle noise on the image. In the next paragraph, we compare the synthetic image produced that obtained by a real airborne radar image from SAR mission

2. NATURE OF THE RADAR IMAGING

The radar data is formed by the reflected energy from a terrain located some distance from the sensor. The energy backscattered unable to arrive complete capteur. It must take into account the distance, the lobe of the antenna, but also the slope and roughness and soil moisture Meier [1] The radar image is acquired by scanning line by line in an axis perpendicular to the axis of flight of the aircraft

2.1 SAR image principle

The radar synthetic aperture radar is transmitting, through a narrow antenna. The transverse resolution is obtained in a manner identical to that of a real aperture radar. However, the angular resolution is improved by the synthetic antenna simulating, by signal processing techniques. These include use of the Doppler effect resulting displacement of the sensor relative to the target during the period of illumination with the actual antenna. Now, if the antenna is small, the better is its resolution. If a phase correction is made so that all echoes received either phase, a perfect coherent integration over the life of all the echoes can be carried

3. CREATING A SYNTHETIC IMAGE WITH FLIGHT PARAMETER OF THE AIRCRAFT OR SATELLITE

The mode of acquisition of a radar image is given by the figure below: the image is acquired by horizontal line by line scanning in directions orthogonal to those of the aircraft or satellite (fig 1.)